

# ENVIRONMENTAL NEWS



**Bad forecast for black petrel**  
**Freshwater fish**  
**Lost birds of Aotea | Marine dumping**  
**Beyond Barrier**



## Editorial

EMMA J. WATERHOUSE

*This 40th issue of Environment News is rather grim reading - a sign of the times. Aotea is surrounded by the oceans and I write this in the week we celebrate International Oceans Day, and the month in which dates were set for the appeal of consent to dramatically increase marine dumping off our southeast coasts.*

A major new United Nations report has raised the spectre of one million species at risk of extinction and highlighted the threat posed by climate change for many species. The report states that only 'transformation change' is can arrest the rate of extinctions in the next few decades. The distribution of almost a quarter of threatened birds may have already been negatively affected by climate change. Impacts of climate change are expected to increase over the coming decades. Marine species, including seabirds, are already at the front line of this battle.

Closer to home, the Northern New Zealand Seabird Trust published a major new report in May — *Threats to Seabirds of Northern Aotearoa New Zealand*. The report highlighted both the incredible diversity and importance of our seabird populations, but also the multiple threats they face every day, from predators on land, fishing interactions, and the increasing effects of climate change. This added pressure, whether it be through

loss of breeding habitat due to land slips, or the challenge of finding food in warmer seas, does not bode well for many species, including our takoketai/black petrel.

Aotea|Great Barrier, like much of New Zealand, used to be covered in seabirds. On the main island, as well as the forty-two motu (islets and small islands) that make up Aotea, seabirds would have been ever present. But it's not just abundance that Aotea has lost, it's species too. At least two types of seabird and eight forest and shore birds since 1868 when the naturalist Hutton visited. More may have been lost, unrecorded by Hutton, but surely known to mana whenua.

Extinctions (and close calls) are not unusual on Aotea, or indeed the Hauraki Gulf/Tikapa Moana/Te Moana-nui-ā-Toi. The New Zealand storm petrel, thought to be lost forever was known only from three specimens collected in the nineteenth century was 'rediscovered' in 2003, and later found to be breeding on Hauturu/Little Barrier Island with a core region of activity during the summer in and around the outer gulf. This is the only place in the world where five species of seabird breed, including takoketai/black petrel. This species continues to hang on (just), and other populations of burrowing seabird, like Cook's petrel also persist on Aotea. But for how long?

*We gratefully acknowledge the support of Chris Morton (co-author of the recent book, Aotea Great Barrier, for the use of his images on this issue's cover and back page.*

*Cover: Hirakimata/Mount Hobson, the highest point on Aotea | Great Barrier Island and home to the largest colony of black petrel. Back page: Kaitoke Swamp to Hirakimata. The swamp is an unusual wetland type containing a zonation from hot springs and freshwater swamp to saltmarsh and tidal mangroves.*

The Northern New Zealand Seabird Trust's report provides numerous recommendations for avoiding and reducing threats to these seabirds, on land and at sea. For Aotea's takoketai, facing challenges at sea, we should be doing everything we can to safeguard the birds, and their breeding sites, right now.

The Minister of Conservation and Assistant Minister for the Environment is Eugenie Sage. She has reinvigorated the Sea Change process with the appointment of an Advisory Committee to progress the goals of Sea Change. Jumping the gun, in May, the Hauraki Gulf Forum voted to recommend two aspirational long-term goals for the 12,000-square-kilometre marine park: that at least 20 per cent of the waters be protected; and that restoration efforts establish 1000 km<sup>2</sup> of shellfish-beds and reefs. Next year marks 20 years for the Hauraki Gulf Marine Park, and with major events like the America's Cup coming to Auckland, the forum says the time is right for all communities of the Hauraki Gulf to come together and commit to action. But the forum itself has no regulatory power - that lies with the agencies that comprise it's membership.

Despite the talk, and all the reports, species are threatened with extinction, and humans continue to view oceans as a convenient out of sight, out of mind dumping ground.

For the community of Aotea this issue is now, literally, too close to home. The recent granting of a permit to dump significantly increased volumes of material dredged from Auckland's harbour, including to make way for America's Cup facilities, has drawn wide criticism. That decision is being appealed by two parties from Aotea.

We also learned last month, that a second application, to use the 'authorised' Cuvier Dump Site to the east of Repanga/Cuvier Island will be made by Ports of Auckland in October. Collectively, this could mean up to half a million cubic metres of Auckland's harbour sediments being dumped just outside the Hauraki Gulf Marine Park boundary, and on Aotea's big blue doorstep. Not a very auspicious start to the parks' next 20 years. It is time for a real sea change, a profound, notable transformation, in thinking as well as action.

Noho ora mai



Photo: K. Waterhouse

Repanga/Cuvier Island is about 22 km from Aotea | Great Barrier Island. The Coastal Resources Limited dump site is about same distance away (approx. 25 km from Medlands Beach). The second site, the 'authorised' Cuvier Dump Site, is further to the east of Repanga.

## 2018: A bad year for takoketai and a grim forecast

KATE WATERHOUSE summarises recent data from *Wildlife Management International's* researchers Nikki MacArthur and Elizabeth (Biz) Bell.

**W**arming sea surface temperatures associated with climate change could represent a new, emerging threat to takoketai/black petrel. In combination with ongoing fisheries-related mortality at sea, and predator impacts on land, this threat could increase the rate of black petrel population decline over the next 5 to 10 years.

Since Biz Bell made her first trip up 'the hill' (as she calls Hiramakimata/Mount Hobson), many things have changed. Bell knows now that the black petrel is called takoketai (*Procellaria parkinsoni*) and that taiko is a name southern people use for their local species, the Westland black petrel (*Procellaria westlandica*). Bell has also been instrumental in visits by fishermen up the hill to see first-hand one of New Zealand's greatest travelers.

**...only 10% of birds that leave Aotea | Great Barrier Island return to breed successfully.**

In a land built on the efforts of great ocean navigators, black petrel can take pride of place. Bell has attached tiny GPS trackers to fledging birds to try to confirm the extent of their travels, and to begin to understand why only 10% of birds that leave Aotea | Great Barrier Island return to breed successfully. This information is the key to black petrel survival into the next century.

### Lighter and smaller birds

Birds now are lighter and smaller than they were when Bell first began studying them on Hiramakimata in 1995. This trend is common amongst seabird species in the Hauraki Gulf and on islands off the northeast coast of the North Island. Bell and other seabird scientists put this down to lower food availability, due to overfishing of squid, krill and small fish in the Pacific Ocean.

Climate change is complicating the picture, warming inshore sea temperature, and pushing

krill out of waters near the breeding colony on Hiramakimata meaning birds feeding chicks or incubating eggs must fly further to feed. On average, female black petrels tracked last season flew 4,273 km on foraging trips during breeding.

None of these factors alone are necessarily catastrophic, but together they could constitute a slow and inexorable path to extinction for black petrel, and many of New Zealand's other burrowing seabirds.

The ongoing decline in seabird populations continue to have a significant impact on other parts of the ecosystem. New Zealand's forests evolved with seabirds burrowing beneath their roots and depositing nutrient-rich guano into the soil<sup>1,2</sup>.

Seabird colonies may even have regional or global effects on the cycling of elements such as nitrogen and phosphorous, far beyond the colony<sup>3</sup>. The positive flow-on effect of these nutrients is now lost to most New Zealand mainland forests, where seabirds no longer breed. On Aotea, the decline continues, with Cook's and black petrel burrows along the ridges of Coopers Castle, and Te Paparahi in the north, destroyed by pigs in the last decade.

### The effect of La Niña on breeding success

Only 52% of study area burrows were occupied by breeding pairs during the 2017/18 season, the lowest occupancy rate recorded since 1999 and 9% lower than the 19-year average of 61%. The fledging success (62%) was also the second lowest recorded since 1995 and 11% lower than the 23-year average of 73%.

This lower than average breeding success appeared to be driven by climatic factors consistent with La Niña conditions. These include more frequent warm northerly and northeasterly winds than normal, heavy rainfall associated with three ex-tropical cyclones in February, and above average sea-surface temperatures in northern New Zealand waters<sup>4</sup>.

Among the 278 breeding burrows, 105 breeding failures were recorded, a failure rate of 38%. Causes of failure included eggs or chicks being washed out of, or drowned, in burrows, eggs or chicks disappearing from burrows, eggs being abandoned or crushed, and chicks dying from starvation.

#### Sea temperatures changing food availability

The anomalous sea-surface temperatures observed in the summer of 2017/18, may have altered the distribution and accessibility of black petrel prey, reducing the foraging efficiency of some birds. Some climate models are now forecasting a prolonged period of unusually high global sea-surface temperatures between 2018 and 2022<sup>5</sup>. Higher than average summer and autumn sea surface temperatures for the Tasman Sea and southwest Pacific could result in a series of relatively poor breeding years for black petrel.

Tracking by GPS of breeding adults undertaking chick-provisioning trips during March and April 2018 (Figure 1) found that adults were travelling an average of 3,633 km<sup>6</sup>.

Tracking devices were deployed on 40 adult birds during chick rearing, yielding 32 complete chick-feeding tracks. These tracks showed that

foraging black petrel were travelling substantially longer distances during the 2017/18 breeding season than had been reported previously. These longer distances indicate that warmer than average sea-surface temperatures may have reduced the birds' foraging efficiency.

#### **...foraging black petrel were travelling substantially longer distances ... than had been reported previously.**

In comparison, nine breeding adults tracked in February and March 2006 (the first time black petrel were successfully tracked) travelled an average distance of 806 km. The birds spent a significant period foraging near the continental shelf off the northeast coast of the northern North Island<sup>7</sup>.

Adult black petrel continue to use previously identified foraging hotspots at the continental shelf break, and over the eastern Chatham Rise. New foraging hotspots were also detected in coastal waters off the west coast of Northland, along the Norfolk and Kermadec ridges, and in pelagic waters to the north and east of the Chatham Rise (see Figure 1).

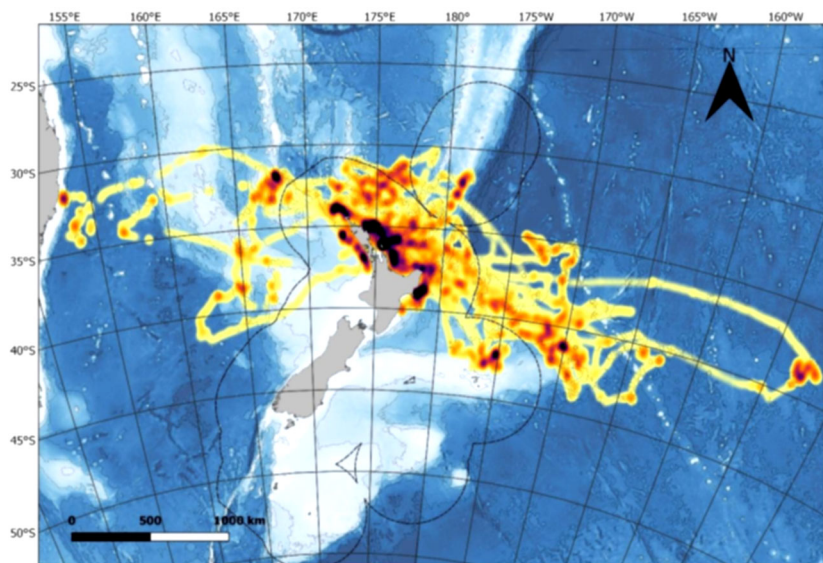


Figure 1: Density map of all black petrel chick provisioning trips from Aotea|Great Barrier Island recorded from March to April 2018. Darker areas represent concentrations of black petrel foraging activity. The black dashed line represents the boundary of the New Zealand Exclusive Economic Zone<sup>6</sup>.



Geolocator devices have been deployed on adult birds migrating to wintering grounds in the eastern Pacific. Tracking data (Figure 2) shows that these birds spent a lot of time within a relatively small area of the eastern Pacific, off the coast of Ecuador and around the Galapagos Islands<sup>8</sup>.

#### Unsustainable fisheries bycatch

Black petrel is recognised as the seabird species at the greatest risk from unsustainably high rates of bycatch in commercial fisheries both within, and beyond, New Zealand's Exclusive Economic Zone<sup>9</sup>. To adequately manage this threat, a spatially-explicit model of bycatch risk is required, incorporating measures of fishing effort, methods and black petrel at-sea distribution and habitat use<sup>10</sup>.

Estimates of the at-sea distribution have to date been generated using a combination of remote tracking data and at-sea counts carried out by fisheries observers and recreational birdwatchers. This data does not adequately describe the at-sea distribution of takoketai at all life stages, nor does it adequately describe

variation in at-sea distribution in response to changes in sea surface temperatures and other environmental variables<sup>10</sup>.

#### Lifting our game: ensuring breeding birds and chicks are protected in NZ waters

Bell and her team are winding up the 2018/19 breeding season monitoring as Environment News goes to print. Only around 1-in-10 black petrel they banded this season will make it back to Aotea to breed. While the species is long-lived (up to 30 years), the ongoing population decline and low rate of survival to breeding age means protection of the birds is critical when they are in New Zealand waters and at the main colony on Hiraikimata.

Like many other species of seabirds breeding in northern New Zealand, black petrel now face an additional and increasing threat from climate change. Smaller breeding birds, undertaking longer foraging trips, will have lower breeding success. Ultimately, this effect is likely to have a negative flow-on to an already low juvenile survival rate.

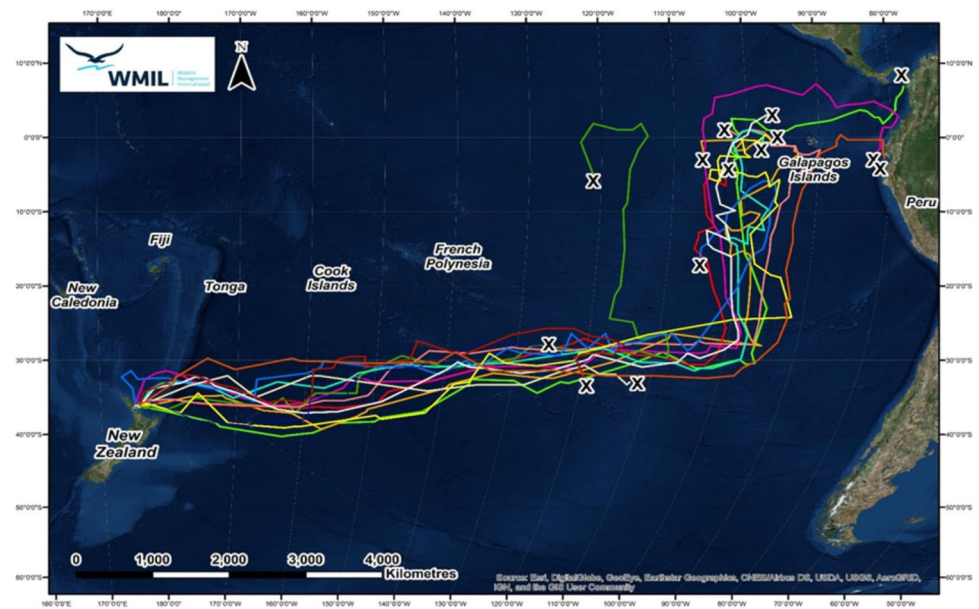


Figure 2: GPS tracks for black petrel fledging from the Hiraikimata colony on Aotea|Great Barrier Island, showing the migration path to the eastern Pacific Ocean taken by young birds in their first months of life<sup>8</sup>.



## Ensuring the survival of black petrel

Despite the bleak predictions, some very concrete actions can be taken to fully protect black petrel when they are in New Zealand waters and at their breeding colonies. These include:

- **Feral cat control on and around HIRAKIMATA:** The Department of Conservation has established regular cat trapping around the colony. Cats are opportunistic and thought to move up the mountain in search of food. Hunting cats out of the area and surrounding ridges is an option not yet taken up.
- **Pig control on and around HIRAKIMATA:** Pigs have been observed destroying burrows and presumably predating eggs and chicks, leading to loss of satellite colonies elsewhere on the island (including on Tataweka and Coopers Castle<sup>11</sup>).
- **Reduce or eliminate at sea seabird risk through mitigation by commercial fishers:** Risks of black petrel being caught in surface and bottom longline and trawl fisheries is well understood. Significant efforts have been made to educate and motivate the inshore fleet, in particular through the Black Petrel Action Group. Fishers signing up to this group in 2014 committed to using

mandatory mitigation and best practice to avoid killing birds when setting long lines and hauling in (birds dive on the baited hooks and unused baits and are either drowned or caught in the hauler). Monitoring outcomes and the activities of the fleet is very limited, an unsatisfactory situation for the largest known preventable cause of death for breeding black petrel.

- **Understand and reduce the at-sea risk to juvenile birds in the eastern Pacific.** The area still in most need of attention. Current research by Wildlife Management International is expected to shed more light on the movement of birds in the eastern Pacific Ocean. Inter-governmental action is required.

### Multiple pressures and known solutions – it's time to act

Warming sea-surface temperatures associated with climate change represent a new, emerging threat to New Zealand's most at-risk seabird. With ongoing (and largely avoidable) impacts on land and at sea continuing, population decline over the next 5 to 10 years will worsen. The Department of Conservation and Ministry of Primary Industries are jointly responsible for the protection of black petrel in New Zealand. It is certainly time for these agencies to step up and act.

### Takoketai - Nationally Vulnerable—Black Petrel

Takoketai/black petrel is ranked as Nationally Vulnerable under the New Zealand Threat Classification System and Vulnerable on the IUCN Red List of Threatened Species. They are the seabird species at greatest risk of being adversely impacted by unsustainably high rates bycatch in commercial fisheries within New Zealand's Exclusive Economic Zone<sup>12</sup>. Bottom-longline fisheries are the key risk to black petrels, but birds also die in surface longline and trawl fisheries. Takoketai/black petrel are also exposed to threats on land, principally predation by feral cats, ship rats and pigs<sup>13</sup>.

A long-term research project aimed at quantifying these population parameters was initiated in 1995/96<sup>13</sup>. A network of study burrows has been established within a 35-ha study area near the summit of HIRAKIMATA/Mt Hobson on AOTEAROA|Great Barrier Island. During the 2017/18 season, 450 study burrows were monitored.



Photo: WMIL



Jacinda Ardern with 'Blackie' in Parliament on 25 March 2013, requesting data from the then Minister of Fisheries on takoketai/black petrel mortality from long-line fleets in Fisheries Management Area 1 (FMA1), the northeast coast of the North Island.

#### Notes:

- <sup>1</sup> Doughty, C. E., Roman, J., Faurby, S., Wolf, A., Haque, A., Bakker, E. S., Svenning, J. C. 2016. Global nutrient transport in a world of giants. *Proceedings of the National Academy of Sciences*, 113(4), 868–873.
- <sup>2</sup> Perry, G. 2018. Ecological function in an age of extinction. *Environment News*, Issue 39, Winter 2018. Great Barrier Island Environmental Trust.
- <sup>3</sup> Otero, X.L., Peña-Lastra, S., Pérez-Alberti, A., Ferreira, T.O., Huerta-Diaz, M.A. 2018. Seabird colonies as important global drivers in the nitrogen and phosphorus cycles. *Nature Communications* 9, Article number: 246 (2018).
- <sup>4</sup> NIWA. 2018. New Zealand Climate Summary: Summer 2017-18. Issued March 2018. NIWA National Climate Centre.
- <sup>5</sup> Sévellec, F., Drijfhout, S.S. 2018. A novel probabilistic forecast system predicting anomalously warm 2018-2022 reinforcing the long-term global warming trend *Nature Communications* 9, Article number: 3024.
- <sup>6</sup> McArthur, N., Ray, S., Crowe, P., Butler, D., Bell, M., Bell, E. 2018. Population trends, breeding distribution and habitat use of black petrels (*Procellaria parkinsoni*) – 2017/2018 operational report.
- <sup>7</sup> Freeman, R., Dennis, T., Landers, T., Thompson, D., Bell, E., Walker, M., et al., 2010. Black Petrels (*Procellaria parkinsoni*) Patrol the Ocean Shelf-Break: GPS Tracking of a Vulnerable Procellariiform Seabird. *PLoS ONE* 5(2): e9236. <https://doi.org/10.1371/journal.pone.0009236>.
- <sup>8</sup> Bell, E.A., Sim, J.L., Scofield, P. 2011. At-sea distribution and population dynamics of the black petrel (*Procellaria parkinsoni*), 2007/08. DOC Marine Conservation Services Series 8. Department of Conservation, Wellington. 37p.
- <sup>9</sup> Richard, Y., Abraham, E.R. 2013. Risk of commercial fisheries to New Zealand seabird populations. New Zealand Aquatic Environment and Biodiversity Report No. 109. March 2013. Ministry for Primary Industries.
- <sup>10</sup> Richard, Y., Abraham, E.R., Berkenbusch, K. 2017. Assessment of the risk of commercial fisheries to New Zealand seabirds, 2006–07 to 2014–15. New Zealand Aquatic Environment and Biodiversity Report 191.
- <sup>11</sup> Bell, E. 2018. Pers. comm.
- <sup>12</sup> Abraham E. R., Richard, Y., Bell, E., Landers, T. J., 2015. Overlap of the distribution of black petrel (*Procellaria parkinsoni*) with New Zealand trawl and longline fisheries. New Zealand Aquatic Environment and Biodiversity Report 161. October 2015. Ministry for Primary Industries.
- <sup>13</sup> Whitehead, E.A., Adams, N., Baird, K.A., Bell, E.A., Borrelle, S.B., Dunphy, B.J., Gaskin, C.P., Landers, T.J., Rayner, M.J., Russell, J.C. 2019. Threats to Seabirds of Northern Aotearoa New Zealand. Northern New Zealand Seabird Charitable Trust, Auckland, New Zealand. 76pp.

## New publication: Threats to Seabirds of Northern Aotearoa New Zealand

In May 2019, the Northern New Zealand Seabird Trust published *Threats to Seabirds of Northern Aotearoa New Zealand*<sup>12</sup>. In the forward to the report, Graeme Taylor notes that *'While there is good public awareness of our unique and unusual land bird species ...very few people appreciate how remarkable is the seabird component of our avifauna.'*

### Multiple threats

The report documents the wide range of threats facing New Zealand's seabird, focusing on northern New Zealand, a global hotspot. Mainland seabird populations are only a fraction of what was, and those that do remain are subject to predation, coastal development and the threats posed by interactions with people and their pets.

For species on islands, like Aotea| Great Barrier Island, predators still pose a threat along with fisheries interactions, plastic ingestion, pollution, and the uncertainties of a changing climate.

### Increased frequency of storms

One of the predictions of future climate is an increasing frequency of storm events. The report notes that burrowing seabirds are at risk of such events which can cause landslips with resulting loss of habitat as well as washout of adults, eggs, or chicks. If the 2014 storm on Aotea had occurred in peak breeding season, it could have been more damaging, with significant number of breeding failures and loss of breeding birds.

### Most at risk from fisheries interactions

The report reiterates what we know already – that black petrels is the species *'nationally most at-risk from interactions with commercial fishing vessels throughout New Zealand's EEZ'*. This status has not changed in almost a decade and breeding birds continue to be lost in the longline fishery and *'this vulnerable population cannot sustain the rate of captures currently estimated from observed incidents...'*

### Key measures to reduce threats

The report sets out measures to address threats to seabirds in northern New Zealand. Those most relevant to Aotea's black petrel include: a predator eradication programme for Aotea; fisheries exclusion zones during breeding seasons; establishing new colonies of highly vulnerable species and improved controls in regional and district plans e.g. restricting cat ownership and dog areas.

While identifying research gaps, the report's authors end with a call for action, stating that *'...it is more important to act to conserve them [seabirds] sooner rather than later. These species are the foundation on which our ecosystems rest, and for their own intrinsic value should be protected in the face of damages that we have wrought'*.



On Aotea, the storm of June 2014 reduced the available breeding habitat for black petrels through landslips by an estimated 10 hectares.

Photo: E. Waterhouse

## Multi-faceted effects of land-use change on streams

FINNBAR LEE (University of Auckland)

*The health of New Zealand's rivers and streams has recently received considerable attention, with a strong focus on the effect of agricultural land-use on water quality and the precarious state of many of our freshwater species. While land-use change can have negative, direct effects on both water quality and biological communities, there are also less considered secondary effects that may turn out to be problematic.*

### Legacy of agricultural land-use

Streams in catchments dominated by agricultural land-use often have reduced riparian vegetation, altered flow regimes, higher and more variable water temperatures, elevated nutrient concentrations and increased primary productivity. The causal mechanisms by which agricultural land-use alter in-stream conditions are well understood. For example, agricultural land-use can result in a reduction in riparian vegetation via clearing, which reduces stream shading and increases water temperature.

More light coupled with sediment and nutrient inputs from bank erosion and fertiliser application can increase stream productivity and macrophyte growth. Finally, proliferation of macrophytes can reduce instream velocities by choking flow in the channel.



Typical stream in an agricultural catchment.

Such changes typically lead to both habitat homogenisation and a reduction in water quality, which in turn affects the composition of biological communities. In degraded streams, community composition may shift but overall productivity often increases, resulting in resource-rich systems that are not particularly suited to some of the original inhabitants, but that provide opportunities for potential invaders.

### Mosquitofish - the 'plague minnow'

The western mosquitofish (*Gambusia affinis*) is one of these. It is the most widely distributed invasive freshwater fish and ranks among the world's 100 'worst' invasive species.



Mosquitofish feeding at the surface of a pond.

Photo: K. Simon

It has been intentionally spread to control mosquito-borne diseases as it preys on mosquito larvae, although its effectiveness is debated. Introduced to the Auckland domain in the 1930s, mosquitofish is now found throughout the North Island (the species made it to Nelson but was quickly exterminated), and favours the warmer waters of the northern half of the North Island.

Mosquitofish's preferred habitat is warm, slow-flowing streams with dense macrophyte cover, exactly the type of conditions agricultural land-use results in. Recently, we showed that the distribution and abundance of mosquitofish is positively associated with the physiochemical and habitat changes to streams associated with agricultural land-use.

Photo: F. Lee

Where conditions are suitable, mosquitofish can explode in numbers and end up dominating the invaded system (hence the moniker 'plague-minnow').

They are voracious predators and internationally are associated with the decline of amphibians and fish (and they likely negatively affect many invertebrate species via predation). In New Zealand, they are known to compete with some whitebait species (Galaxiids), prey on invertebrates and affect ecosystem functioning.

### Native freshwater fish

Like many of our other taxonomic realms, New Zealand's freshwater species are unique and highly threatened. We have 72 species of fish (57 native, 15 introduced), of which 31 are endemic, a high ratio by global standards.

### Forty of our 57 native freshwater fish, are threatened with extinction...

Seventy percent of native freshwater fish are threatened with extinction (again high by global standards) and one species, upokororo/New Zealand grayling (*Prototroctes oxyrhynchus*) is now extinct.

The negative effects associated with agriculture and poor water quality are well known, but less obvious negative impacts, such as facilitating invasive species, can exacerbate the effects of land-use change and further threaten our freshwater species.

While mosquitofish are not yet known to occur on Aotea, vigilance is essential as there is plenty of potential habitat for them on the island (Figure 1), including around Okiwi, Claris, Medlands and Tryphena, and anywhere else with significant land clearance.

These fish are frequently caught as pets by children and rereleased (technically illegal). If they were to make it here, several rare native fish (for example, shortjaw kokopu) would suffer from the mosquitofish's presence.

#### Note:

<sup>1</sup> Crow, S. 2018. New Zealand Freshwater Fish Database. Version 1.6. The National Institute of Water and Atmospheric Research (NIWA). Occurrence dataset <https://doi.org/10.15468/ms5iq4> accessed via GBIF.org on 2018-11-12

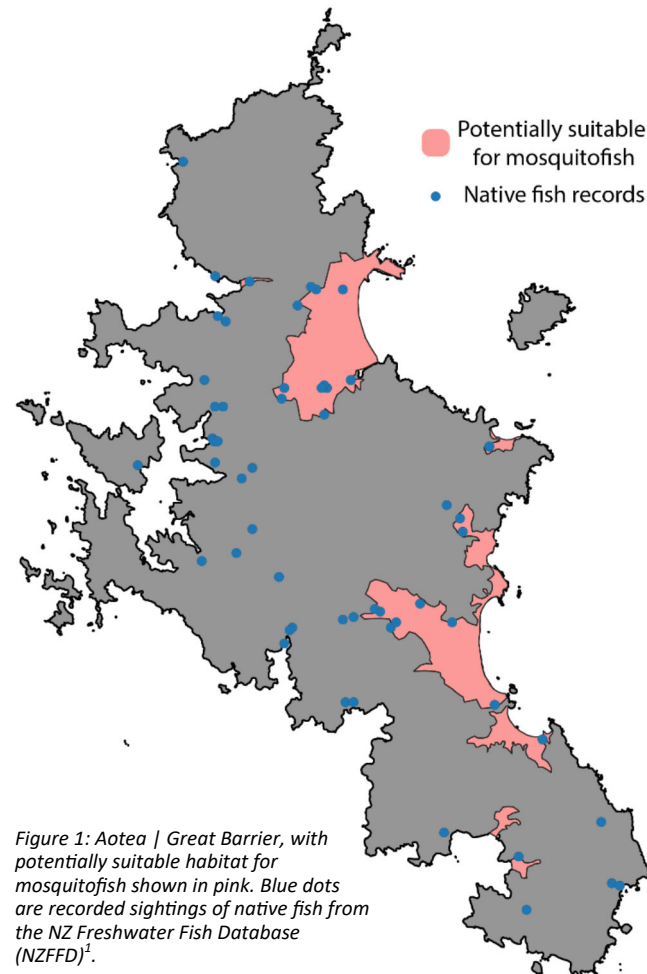


Figure 1: Aotea | Great Barrier, with potentially suitable habitat for mosquitofish shown in pink. Blue dots are recorded sightings of native fish from the NZ Freshwater Fish Database (NZFFD)<sup>1</sup>.

### Native fish on Aotea

At least 10 of New Zealand's 57 species of freshwater fish are found on Aotea, including multiple species of kokopu, inanga and long and short-finned eels (Table 1). Four of the 10 species are recorded as declining (on a national level), and one, shortjaw kokopu, is listed as nationally vulnerable.

The first record of the Dart goby in New Zealand was made on Aotea, a self introduced species from Australia, classified as a coloniser. Four of the five whitebait species are present and the fifth species, giant kokopu, was formerly present but is now possibly locally extinct. Little information beyond occurrence is available, and the status of these species on Aotea is largely unknown.

Table 1: Native fish found on Aotea | Great Barrier Island and their conservation status, based on New Zealand Freshwater Fish Database records<sup>1</sup>.

Species	Scientific name	Conservation status
Banded kokopu	<i>Galaxias fasciatus</i>	Not Threatened
Bluegill bully	<i>Gobiomorphus hubbsi</i>	Declining
Common bully	<i>Gobiomorphus cotidianus</i>	Not Threatened
Dart goby	<i>Parioglossus marginalis</i>	Coloniser
Giant bully	<i>Gobiomorphus gobioides</i>	Naturally Uncommon
Inanga	<i>Galaxias maculatus</i>	Declining
Koaro	<i>Galaxias brevipinnis</i>	Declining
Longfin eel	<i>Anguilla dieffenbachii</i>	Declining
Redfin bully	<i>Gobiomorphus huttoni</i>	Not Threatened
Shortfin eel	<i>Anguilla australis</i>	Not Threatened
Shortjaw kokopu	<i>Galaxias postvectis</i>	Nationally Vulnerable



Photo: S. Moore, NIWA

Left: Redfin bully, one of New Zealand's most colourful freshwater fish. Spawning takes place in fresh water and after hatching the larvae are swept out to sea. Juveniles enter fresh water in spring and reach maturity about two years later.

Below: Adult inanga, the smallest of the five whitebait species, inhabit open rivers, streams, lakes, and swamps near the coast.



Photo: S. Moore, NIWA

S.C. Moore

# Marine disposal of dredge spoil—another case of out of site out of mind

EMMA WATERHOUSE

**O**n 21 May, I presented to the Hauraki Gulf Forum on behalf of the GBIET on our concerns about the lack of a strategy for the disposal of dredge spoil from Auckland and Waikato's harbours and marinas.

The recent decision by the Environmental Protection Authority (EPA) to grant consent to Coastal Resources Limited (CRL) to increase by 500% the volume of spoil dumped at the northern disposal site, just 25 km from Aotea|Great Barrier Island, has left many dismayed. That decision will be appealed before the High Court in July<sup>1</sup>.

But we didn't go to speak about the CRL application, rather the lack of a coordinated, approach to how dredge spoil will be managed in the long term. We posed five questions (see box) and challenged agencies to take accountability and make an intentional policy on how dredge spoil should be disposed of, rather than "policy" determined by individual consent applications as it is now.

## Ongoing "policy" failure

The Ports of Auckland also presented to the forum. The representatives presented their plan to dredge deeper shipping channels and dispose of this material at the 'authorised' 'Cuvier Dump Site', 27 nautical miles east of Cuvier Island. The application will be lodged with the EPA in October 2019 and will include disposal of up to 2 million cubic metres of dredge material initially, with up to 50,000 cubic metres annually thereafter. To be clear, this is not the same site as the CRL one.

## Five 'authorised' dump sites around NZ

The Cuvier Dump Site is one of five listed in the Dumping and Discharge Regulations 2015<sup>2</sup>. Dumping of dredged material and vessels are non-notified activities in these locations. Outside of the sites, all dumping must be notified. Non-notified means that the application will not be publicly notified and submissions are not sought. Applicants are

required to identify any 'interest holders' and record any consultation undertaken<sup>1</sup>.

## New Zealand's international obligations

The *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* was implemented in 1975. The 1996 Protocol to the convention demands all practicable steps are taken to prevent pollution of the sea by dumping of wastes and other matter<sup>2</sup>. A key principle is avoidance, re-use and minimisation of waste to minimise the amount of material dumped at sea.

While this principle is a well-established requirement in New Zealand law, the ongoing dumping of dredge spoil from Auckland's harbours into the Hauraki Gulf, let alone the increases proposed, would seem at odds with the requirement to avoid and minimise waste entering our oceans.

## What you can do

Write to Phil Goff (Mayor of Auckland), Eugenie Sage (Minister of Conservation) and David Parker (Minister for the Environment) asking the five questions in the box below.

## Notes:

<sup>1</sup> <https://www.epa.govt.nz>

<sup>2</sup> <https://www.maritimenz.govt.nz/commercial/environment/marine-dumping>

## Questions to the Hauraki Gulf Forum

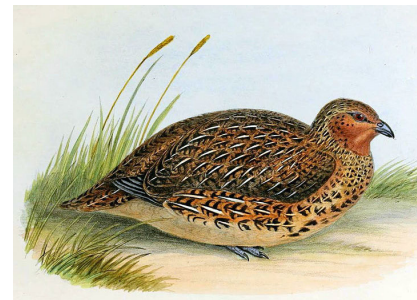
1. How can dredge spoil be managed without high risks to, and impacts on, the Hauraki Gulf Marine Park, its islands and marine species?
2. Are voters and ratepayers really happy for government and councils to perpetuate this practice?
3. Is the current practice meeting our international obligations to "minimise material to be dumped at sea?"
4. How can the alternatives to marine disposal be explored and fast-tracked?
5. How can more realistic disposal costs be built into the cost of operation of ports as the region continues to grow?

# Lost treasures of Aotea: Ngā manu, the birds

KATE WATERHOUSE, with contributions from John Ogden and the 2010 Great Barrier Island State of the Environment Report.

**I**n 2010, the Great Barrier Island State of the Environment Report<sup>1</sup> found that of 82 species of bird known to have been present in 1868 (when the naturalist Hutton visited and made a list), 12 are known to have gone extinct here.

The species lost to the island since 1868 are shown in Table 1. The endemic koreke/NZ quail (*Coturnix novaezelandiae*) recorded on Aotea|Great Barrier Island by Hutton must have been some of the last individuals of the species, which became extinct (worldwide) about 1875.



Lithographic plate by C. J. Hullmandel

Koreke/NZ quail (*Coturnix novaezelandiae*) was recorded on Aotea in 1868. Only a few years later the species was extinct.

## Forest species have lost out

The birds lost since 1868 are mainly from forest habitats. In percentage terms, Aotea has lost 33% of its forest bird species.

The most recent birds to be lost from the island are the kōkako (*Callaeas wilsoni*), pōpokea/whitehead (*Mohoua albicilla*), and probably tītipounamu/rifleman (*Acanthisitta chloris*). Kōkako survived in the northern block, Te Paparahi, until 1996, when the last two male birds were caught by the Department of Conservation and taken to Hauturu/Little Barrier Island.

Whitehead persisted on Rakitu/Arid Island, after disappearing from the main island, until

at least 1957. Despite intensive searching in 1981, none could be found. The tiny rifleman, New Zealand's smallest bird, was reported (but not seen) in 1972 with occasional claims of sightings since then, including in 2008. The bird can be confused with the equally tiny grey warbler, or even silvereye. No experienced observer appears to have recorded rifleman since 1868, and they must be presumed extinct on the island.

Hutton's record of the yellow-crowned parakeet (*Cyanoramphus auriceps*) has been questioned by later writers. Kārearea/New Zealand falcon (*Falco novaeseelandiae*) may still be an occasional visitor from the Coromandel Peninsula, but it is not a permanent resident.

Many of those species remaining, such as kereru (*Hemiphaga novaeseelandiae*) and red-crowned parakeet/kakariki (*Cyanoramphus novaezelandiae*), are now in much smaller numbers. Hutton may have missed some species and knowledge of additional species that may have been present is likely to have been held by tangata whenua.



Saddleback/tieke (*Philesturnus rufusater*) was once on Aotea but cannot coexist with rats.

Lithographic plate by J. G. Keulemans - Buller's A History of the Birds of New Zealand, 2nd edition, 1888.

Table 1: Bird species lost to Aotea/Great Barrier Island since 1868.

Extinct on Aotea	Notes
Koreke/New Zealand quail	Extinct nationally about 1875
Tūturuatu/shore plover	Since 1970s, only found on the Chatham Islands
Hihi/stitchbird	Last population on Hauturu until translocations to predator free islands from 1980s
Kōkako	Last birds removed to Hauturu in 1996
Saddleback/tīeke	Last natural population on Hen Island, now on predator free islands and in mainland sanctuaries
Pīpipī/brown creeper ( <i>Mohoua novaeseelandiae</i> )	Confined to the South Island
Pōpokatea/whitehead	Survived on Rakitu/Arid Island until at least 1957
Titipounamu/rifleman	Recent reports unconfirmed, probably extinct on Aotea
Kākāriki/yellow-crowned parakeet	Small numbers of red-crowned parakeet remain on Aotea (population size unknown)
Black-bellied storm petrel ( <i>Fregetta tropica</i> )	Now breed only on predator-free sub-Antarctic islands
White-headed petrel ( <i>Pterodroma lessonii</i> )	Now breed only on predator-free sub-Antarctic islands
Kārearea/NZ falcon	Not seen, potential visitor from Coromandel Peninsula
Korimako/bellbird ( <i>Anthornis melanura</i> )	Vagrant only, possible recent breeding attempts in Okiwi
Tomtit ( <i>Petroica macrocephala</i> )	Unclear if breeding on Hirakimata/Mt Hobson

### Marine and coastal species lost

In contrast to terrestrial habitats, marine and coastal environments have undergone less change. One coastal bird, tūturuatu/shore plover (*Thinornis novaeseelandiae*) has been lost, and other species including the New Zealand dotterel, banded dotterel, wrybill, Caspian tern, reef heron, red-billed gull, black shag, little black shag, variable oystercatcher and even little blue penguin are at risk.

### Wetland species

Aotea has one large wetland, Kaitoke Swamp, also inhabited by rats, cats and pigs. Despite these pressures, the swamp is a key site for fernbirds in the Auckland region, and provides habitat for banded rails, spotless crane and occasional bittern.

Most other wetlands, such as those formerly behind the dunes at Awana, Claris and Medlands, have been drained and their native

birds have been replaced by the introduced generalists.

Pateke/brown teal (*Anas chlorotis*) are hanging on due to intensive management by the Department of Conservation at Okiwi, but pure strains of grey duck have been nearly eliminated by interbreeding with mallards.

### Introduced bird species

Meanwhile, the island has gained numerous farmland birds, that have flooded into the new human-made habitats.

Since Hutton's time, 25 new species have found their way here, predominantly generalist European birds, such as sparrows, finches and starlings.

The shift in landscape, from the predominant forest habitats of Hutton's visit, to the more open farmed landscape this century, has resulted in significant change in bird populations.

Table 2: Bird species, at risk nationally, and still present on Aotea/Great Barrier Island.

Nationally Vulnerable	Declining Nationally	Uncommon nationally
Kākā	Fernbird	Long-tailed cuckoo
Bittern	New Zealand pipit	Banded rail
Black petrel	Variable oystercatcher	Black shag
Grey duck	Pied oystercatcher	Little black shag
New Zealand dotterel	Pied stilt	Little shag
Banded dotterel	White-fronted tern	Fluttering shearwater
Wrybill	Blue penguin	Buller's shearwater
Reef heron		Fairy prion
Red billed gull		Diving petrel
Caspian tern		
Pied shag		
New Zealand storm petrel		
Pateke/brown teal		
Weka (Rakitu, introduced)		

### It's not all about the birds

Plant species can also become extinct if their pollinator die out – as occurred in the early 1900s when bellbirds disappeared from Aotea, very probably due to the arrival of ship rats. So too did Adam's mistletoe disappear, which was specifically designed to be pollinated by bellbirds. The only image of this plant was



Adam's mistletoe - this is the only image of the plant, painted by Fanny Osbourne, from a piece collected near Tryphena.

painted by Fanny Osbourne from a piece collected by her husband near Tryphena sometime around the end of the 19th century.

In 1981, C. C Ogle<sup>2</sup>, of the then New Zealand Wildlife Service, reported finding nine species of lizard, two species of frog, two species of Rhytidid molluscs, and eight species of introduced wild mammals during surveys undertaken on the island. Species found included the first known records from Aotea of spotless crane (*Porzana tabuensis*), Hochstetter's frog (*Leiopelma hochstetteri*), the mollusc *Rhytida greenwoodi*, as well as an unidentified lizard. The survey team noted that the 12 known lizard species represents the greatest variety of species on any island or comparable area of mainland, in New Zealand.

John Ogden goes further in the 2010 State of the Environment Report for Great Barrier Island. He notes that the island

'...carries about a quarter of the New Zealand total for vascular plants, lichens and birds! These results indicate the extraordinary richness of the biota of this small Island, probably reflecting its position close to the boundary between the 'sub-tropical' north and the temperate south of the North Island. The same appears to apply in the marine habitat, with at least 6 marine mammals, 160 species of marine fishes and 626 marine molluscs'.



Ogden goes on to note that this richness of native species is even more remarkable when we consider that a significant number have probably been lost since European arrival. For example, species such as land snails may have been lost during the logging era, when extensive stream scouring and bush fires could have greatly reduced available habitat.

#### Can extinctions be prevented?

Without ongoing management, further bird species are likely to be lost from by a combination of predation by rats and feral cats, habitat degradation by pigs and feral cattle, and competition from introduced birds. Climate change, in particular extreme events and their effects, will also present challenges to the island's species. It may take longer than on the mainland, but population trends are likely to continue to decline.

Aotea residents and ratepayers, and all agencies involved with the island, place

considerable value Aotea's environment. However, community and agency responses generally do not match the nature and scale of the problems. There is no doubt that introduced plants, birds and mammals present risks for the remaining native species.

The pressures set in motion by the historic transformation of the island environment, especially the arrival of rodents, could still result in a wave of further extinctions, even of species currently considered relatively common and iconic.

We can all make a difference to the future of Aotea's island species. Trap rats, be vigilant for introduced species, and help restore degraded environments. Their future is in our hands.

#### Notes

<sup>1</sup> Ogden, J., Westbrooke, L. 2010. *Great Barrier Island State of the Environment Report. Great Barrier Island Charitable Trust.*

<sup>2</sup> Ogle, C.C. 1981. *Great Barrier Island Wildlife Survey. Tane 27, 1981. New Zealand Wildlife Service, Department of Internal Affairs, Wellington.*

## Updating our knowledge of the state of Aotea's birds

### Gathering data and knowledge - the example of kereru

For some species, as Ogden noted in the 2010 report, we simply have no data, although there is, for example, persistent anecdotal reporting of a fall in kereru numbers on the island. Such declines, if real, will have flow-on effects to forest health as fewer kereru will be dispersing seeds of key forest species such as taraire, miro, matai, puriri, tawa, and nikau. The status of kereru requires urgent assessment. Kereru are at risk from predation by feral cats and from habitat loss affecting their food sources, potentially leading to starvation.

The matauranga Māori, or traditional knowledge of Ngati Rehua Ngatiwai ki Aotea, will be an important contribution to future studies of the island's ecology. Four of the founding waka were known to have visited Aotea | Great Barrier Island beginning more than 600 years ago. The earliest written reports only began with Hutton's from 1868.

### Environment Aotea - State of our Birds 2019

In 2019, the Great Barrier Island Environmental Trust will update the State of the Environment Report with a focus on birds. Thanks to funding allocated in October 2018 by the Great Barrier Local Board, the trust will prepare the 'Environment Aotea - State of our Birds 2019' report. This document will update the information on land and sea birds contained in the 2010 report.

We hope that the process to prepare the 'State of our Birds' report will involve members of the Aotea community who want to participate as well as government agencies and local and central government, scientists and researchers in their specialist fields. The process is planned to be highly collaborative, as we know that the data and information required to compile the report is in many different sources. Such collaboration allows opportunities for all participants to learn from each other.

**For further information, or to participate in this project, please contact Emma Waterhouse or George Perry (contact.gbiet@gmail.com).**



## Beyond Barrier

### ENVIRONMENTAL NEWS FROM NEW ZEALAND & AROUND THE WORLD

#### One million species risk extinction

In May, an alarming headline was run by most major news organisations around the world - 'One million species face extinction, a UN report says'.

The report<sup>1</sup> was released by the United Nation's Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) which is tasked with assessing the state of biodiversity and the ecosystem services it provides to human society.

Seven lead authors from universities around the world prepared the report, which also draws (for the first time ever at this scale) on indigenous and local knowledge.

The report found that **one million animal and plant species are on the verge of extinction**, many within decades, and more than ever before in human history. Species loss is linked directly to human activity.

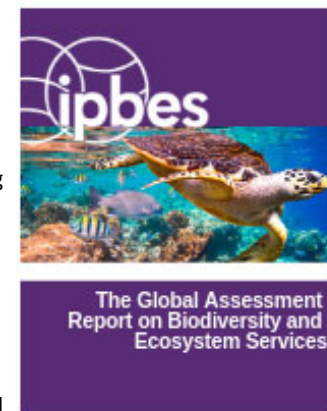
*"The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide<sup>1</sup>."*

The assessment's authors ranked the five direct drivers of change in nature with the largest global impacts so far being: changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasive alien species.

Despite progress to conserve nature and implement policies, the report finds that global goals for conserving and sustainably using nature and achieving sustainability cannot be met at current trajectories. Goals for 2030 and beyond may only be achieved through 'transformative changes across economic, social, political and technological factors'.

Notes:

1. IPBES. 2019. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science- Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES Secretariat, Bonn, Germany.



### Increasing pressure on natural systems - the facts at a glance

- Three-quarters of the land-based environment and about 66% of the marine environment have been significantly altered by human actions.
- Urban areas have more than doubled since 1992.
- About 60 billion tons of resources are extracted globally every year - doubling since 1980.
- The average abundance of native species in most major land-based habitats has fallen by at least 20%, mostly since 1900.
- The number of invasive alien species per country has risen by about 70% since 1970, across the 21 countries with detailed records.
- In 2015, 33% of marine fish stocks were harvested at unsustainable levels; 60% maximally sustainably fished, and 7% harvested sustainably.
- Plastic pollution has increased tenfold since 1980, and 300 to 400 million tons of heavy metals, solvents, toxic sludge and other wastes are dumped annually into the world's waters.



## Climate change potential to accelerate island extinctions

Researchers are beginning to better understand how multiple threats, such as invasive species, habitat loss, and climate change, might effect island wildlife<sup>1</sup>.

Several examples illustrate the very real compounding effects of these threats. For the Baird's sandpiper (*Calidris bairdii*), a rare visitor to New Zealand, climate change is the number one threat. The species use environmental and climatic clues throughout the year, such as seasonality of food supply. **If the timing of food availability changes, the birds are unlikely to rapidly adapt.** Chicks emerging earlier in the season (before their food supply is at peak abundance) are less likely to survive.

Some species are already gone. The Bramble Cay melomys (*Melomys rubicola*) was a small mammal living only on Bramble Cay, off Australia. Historically, several hundred were on the island, which has been reduced in size by rising sea levels from 4 to 2.5 hectares. The last sighting of a melomys occurred in 2009.

Loggerhead and hawksbill sea turtles are facing serious climate-related issues including changing currents, disturbances to food webs, and decreased nesting habitat. The temperature of incubation can influence the gender of offspring and hotter sand will lead to more females being born. Potentially beneficial in the short term, a major skewing of gender long-term is likely to pose serious risk to their viability.



Photo: T. Hall/  
Island Conservation

Newborn hawksbill sea turtle.

Despite species-specific conservation efforts, climate change is very likely to lead to irreversible losses to species around the world, with island wildlife at extremely high risk.

### Note

<sup>1</sup> <https://www.islandconservation.org/climate-change-island-extinctions/>

## Lord Howe Island commences rodent eradication project

Lord Howe is the largest inhabited island in the world to undertake a full scale eradication of rodents. Operations started in May and baiting is expected to take several months, with the island monitored for two years to confirm that the rats are gone<sup>1</sup>.



Photo: I. Hutton

Lord Howe Island, 780 km northeast of Sydney. Rats invaded from a sinking ship in 1918.

**The project has created tensions in the small island community of 350 people.** Concerns range from health effects to the potential for accidental deaths of threatened species. In an interview for the Australian Broadcasting Corporation (ABC), the chair of the local board acknowledged the divisions on the island, which "are understandable"<sup>2</sup>. The project was declared safe for residents and visitors, including in a 2017 human health risk assessment completed in by the NSW Office of the Chief Scientist<sup>3</sup>.

In the same ABC article, a sixth generation islander reflected on the loss of bird life. *"Growing up here, every weekend we'd go for a walk in the bush with Dad, and he would point out every bird's nest, every tree. And slowly that's being eroded away, to the extent now that we go for a walk in the bush and it's quiet. There are species you rarely see, they've just been decimated."*<sup>2</sup>

### Notes

<sup>1</sup> <https://lhiodenteradicationproject.com/>

<sup>2</sup> <https://www.abc.net.au/news/2019-06-11/rat-infestation-on-lord-howe-island-splits-residents/11180624>

<sup>3</sup> NSW Office of the Chief Scientist and Engineer. 2017. Report on the Human Health Risk Assessment for the Lord Howe Island's proposed Rodent Eradication Program. Chief Scientist & Engineer. July 2017.



Great Barrier Island  
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## Keen to help us Love, Protect, and Restore Aotea | Great Barrier Island?

### Become a Great Barrier Island Environmental Trust member

**Annual:** Individual: \$25; Family: \$35; Senior: \$20; Student: \$15

Corporate I: \$200 (up to 5 employees)

Corporate II: \$300 (over 5 employees)

**Life:** Individual: \$250; Family: \$330; Senior (> 65): \$200

**You can also sponsor** particular activities or projects, or **make a significant donation.**

Contact us for options at [contact.gbiet@gmail.com](mailto:contact.gbiet@gmail.com)

Email your name, address, and phone contact details to [contact.gbiet@gmail.com](mailto:contact.gbiet@gmail.com) and deposit your supporter member donation to ASB 12-3110-0058231-00 referencing your name. All donations are tax deductible.

Or, send these details plus your cheque to Great Barrier Island Environmental Trust, PO Box 35, Okiwi, Great Barrier Island, 0963.

**Thank you!**



### DID YOU KNOW?

You can access back issues of the Environment News (and Bush Telegraph) online at:  
<http://www.gbiet.org/news>

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The Great Barrier Island Environmental Trust gratefully acknowledge the support of the Great Barrier Local Board for the printing of Environment News.



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